Table 1. Ambient data for produced water (015) and generalized surface discharge modeling[a].

Operator/Facility	Average Depth (m)	Discharge Depth (m)	Current Velocity (m/s)[b]	Ambient Density: Uniform Average Density, Summer (kg/m^3)	Ambient Density: Uniform Average Density, Winter (kg/m^3)	Summer Temp. (C)	Summer Salinity (0/00)	Winter Temp. (C)	Winter Salinity (0/00)
Unocal									
Granite Point Tank Farm	15.2	15.2	0.2, 0.8, 2.3	1018	1025.5	11	23	4	32
Trading Bay Treatment Facility	10.1	10.1	0.2, 0.8, 2.3	1018	1025.5	11	23	4	32
Platform Anna	21.0	21.0	0.2, 0.8, 2.3	1018	1025.5	11	23	4	32
Platform Bruce	18.9[c]	18.9[c]	0.2, 0.8, 2.3	1018	1025.5	11	23	4	32
XTO Energy									
East Foreland	7.6	7.6	0.2, 0.8, 2.3	1018	1025.5	11	23	4	32
ConocoPhillips									
Tyonek Platform A	31.1	31.1	0.2, 0.8, 2.3	1018	1025.5	11	23	4	32
All Operators									
Generalized Surface Discharge[d]	1 [e]	0.75[e]	0.2, 0.8, 2.3	1018	n/a	11	23	n/a	n/a

[a]Assumptions for all facilities: unbounded; Manning's n=0.025.

[b]10^{th}, 50^{th} and 90^{th} percentile current speeds for data set consisting of 48 hours surrounding lowest and 48 hours surrounding highest 2004 Nikishka currents.

[c]Modeled as 13.6 m in order to maintain depth of port while satisfying CORMIX assumptions about port height (max. 1/3 of water depth).

[d]For high flow/biocide/corrosion inhibitor analysis; summer conditions only were evaluated.

[e]Exceptions are noted in Table 4.

Table 2. Effluent data for produced water (015) and generalized surface discharge modeling.

Operator/Facility	Flow Rate (m^3/s)	Density, Summer (kg/m^3)	Density, Winter (kg/m^3)	Temperature, Summer (C)	Temperature, Winter (C)	Salinity (0/00)
Unocal						
Granite Point Tank Farm	0.000307	1009	1012.5	37.5	27.5	21
Trading Bay Treatment Facility	0.245289	1016	1019	27	17	26
Platform Anna	0.002234	1006	1009	33	23	15
Platform Bruce	0.000504	1008.5	1010.5	26	16	15
XTO Energy						
East Foreland	0.036803	1016	1017.5	15	5	22
ConocoPhillips						
Tyonek Platform A	0.001361	1002	1002	15.9	15.9	4
All Operators						
Generalized Surface Discharge	Note a	n/a	n/a	20	n/a	0 [b]

[a] Range of 0.000044 m^3/s (1,000 GPD) to 0.044 m^3/s (1,000,000 GPD), see Table 4.

[b] Assumed fresh at 20 C; summer conditions only were evaluated.

Table 3. Discharge data for produced water (015) and generalized surface discharge modeling.

Operator/Facility	Nearest Bank (R/L)	Distance to Nearest Bank (m)	Port Diameter (m)	or	Port Area (m^2)	Vertical Angle THETA (degrees)	Horizontal Angle SIGMA (degrees)	Current Cardinal Direction (degrees)	Discharge Cardinal Direction (degrees)	Port Height (m)
Unocal										
Granite Point Tank Farm	R	1400	0.07620			90	0	225/45	n/a	1.5
Trading Bay Treatment Facility	R	800	0.40638[a,b]			0	0/180	360/180	360/180	0.0
Platform Anna	R	4023			0.07742	45	45/225[c]	225/45	180	0.9
Platform Bruce	R	2575	0.07620[d]			-45e	0	225/45	n/a	11.6[f]
XTO Energy										
East Foreland	L	244	0.20319[g]			0	25/205	225/45	20	0.3
ConocoPhillips										
Tyonek Platform A	L	9817	0.10160[h]			-45i	180/0	225/45	45	2.1
All Operators										
Generalized Surface Discharge	L	1000	Note j			0	0	n/a	n/a	0.25[k]

[a]Simulated as a single, 0.575 m diameter pipe for 10th and 50th percentile currents; simulated as 0.368 m diameter for 90th percentile current.

[b]Rough hydraulic calculation revealed that full flow would be through down-current port for the 90th percentile current speed.

[c]Analysis was based on the 225 degree horizontal angle; actual outfall configuration could not be simulated for 45 degrees.

[d]Modeled as 0.067 m (2.6"), 0.033 m (1.3") and 0.019 m (.75") for 10th, 50th and 90th percentile currents, respectively.

[e]Actually -90 degrees (straight down).

[f]Modeled as 3.65 m, with 13.6 m water depth, in order to satisfy CORMIX height assumptions while maintaining actual port depth.

[g]Simulated as 0.149 m diameter for 90th percentile current, SIGMA=25 degrees.

[h]For SIGMA=45, simulated as 0.055 m and 0.032 m for 50th and 90th percentile currents, respectively.

[i]THETA= -45 based on historical data; operators think discharge is horizontal but have not confirmed; simulation is not sensitive to THETA in this case anyway.

[j]Varied with flow rate and current speed such that exit velocity equalled current speed, see Table 4.

[k]Exceptions are noted in Table 4.

Table 4. Flow and diameter data for generalized surface discharge modeling.

Flow		Diameter (m) by Current Speed		
GPD	m^3/s	0.2 m/s	0.8 m/s	2.3 m/s
1000	0.000044	0.01670	0.00835	0.00492[a]
5000	0.00022	0.0373	0.0187	0.0110[b]
10000	0.00044	0.0528	0.0264	0.0156
50000	0.0022	0.118	0.0590	0.0348
100000	0.0044	0.167	0.0835	0.0492
500000	0.022	0.373[c]	0.187	0.110
1000000	0.044	0.528[d]	0.264[e]	0.156

[a]Average depth, discharge depth, and port height set to 0.4 m, 0.3 m and 0.1 m, respectively.

[b]Average depth, discharge depth, and port height set to 0.8 m, 0.6 m and 0.2 m, respectively.

[c]Average depth, discharge depth, and port height set to 1.12 m, 1.12 m and 0.373 m, respectively.

[d]Average depth, discharge depth, and port height set to 1.584 m, 1.584 m and 0.528 m, respectively.

[e]Average depth, discharge depth, and port height set to 0.792 m, 0.792 m and 0.264 m, respectively.